Fisheries Research Brief

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A Simple Method for Monitoring Zooplankton Forage and Evaluating Flatwater Stocking Programs

Dillon (1996) observed that the success of fall fingerling plants was significantly related to the presence of large (>2 mm) zooplankton. Despite that finding and similar examples in the literature, basic fisheries monitoring programs often fail to include zooplankton data. The reluctance stems from time-consuming and expensive analysis procedures.

In this management brief, I describe a simple approach for evaluating zooplankton size and abundance without microscope work. Processing time takes about 5 min per sample. The new method, developed by the Wyoming Department of Game and Fish, was used to collect and analyze 268 zooplankton samples from 40 Idaho waters in August 1998.

Zooplankton were collected using three nets fitted with small (153:), medium (500:), and large (750:) mesh. The 500: net collects usable (>0.6mm) zooplankton. Zooplankton smaller than 0.6 mm pass freely through the 500: net (Seda and Dostalkova 1996) and are generally not susceptible to trout predation. The 750: net collects preferred (>1.0mm) zooplankton. The 153: net is a standard mesh used for general monitoring purposes.

The zooplankton were preserved in denatured ethyl alcohol at a concentration of 1:1 (sample volume:alcohol). After two to ten days in alcohol, phytoplankton were removed from the samples by refiltering through a 153:-mesh sieve. Samples should be preserved for at least two days to break down the phytoplankton and to standardize weight loss from dehydration. The remaining zooplankton were blotted dry with a paper towel and weighed to the nearest 0.1g. Biomass estimates were corrected for tow depth and reported in g/m. **The only lab work required is the wet weight measurement. No sorting or counting is necessary!**

The zooplankton biomass data can be used in several ways to help evaluate hatchery trout stocking programs. First, the zooplankton biomass from the 153: net provides an estimate of relative production potential. For example, mean biomass from the 153: net ranged form 0.02g/m to 2.68g/m in the 40 waters sampled in 1998. Values less

than 0.10g/m are very low and conservative stocking densities are warranted in those fisheries.

Secondly, competition for food (or cropping impacts by fish) can be assessed using a zooplankton ratio method (ZPR). The ZPR is defined as the ratio of preferred to usable zooplankton (750: 500:). If the ZPR is less than 0.25, most of the preferred zooplankton are being cropped by fish. Moreover, Wyoming researchers found that ZPR explained a significant portion of the variation in carryover survival of rainbow trout. Based on those results, Wyoming developed general stocking guidelines for hatchery rainbow trout. The guidelines are: stock 150 to 300 fingerlings per acre at ZPR >0.60, stock 75 to 150 fingerlings per acre at ZPR of 0.25 to 0.60, and stock only catchables in waters with ZPR <0.25.

A limitation of the ZPR model, however, is that the overall abundance of zooplankton is not considered. To account for that bias, I developed the zooplankton quality index (ZQI). The ZQI is a measure of abundance and zooplankton size ratios (ZQI = (500: + 750:)ZPR). Figure 1 shows ZQI values and stocking recommendations for 40 waters sampled in 1998. **In short, the ZQI provides a simple and quick method to assess forage resources and can be used to adjust fingerling stocking densities to match the availability of prey.**

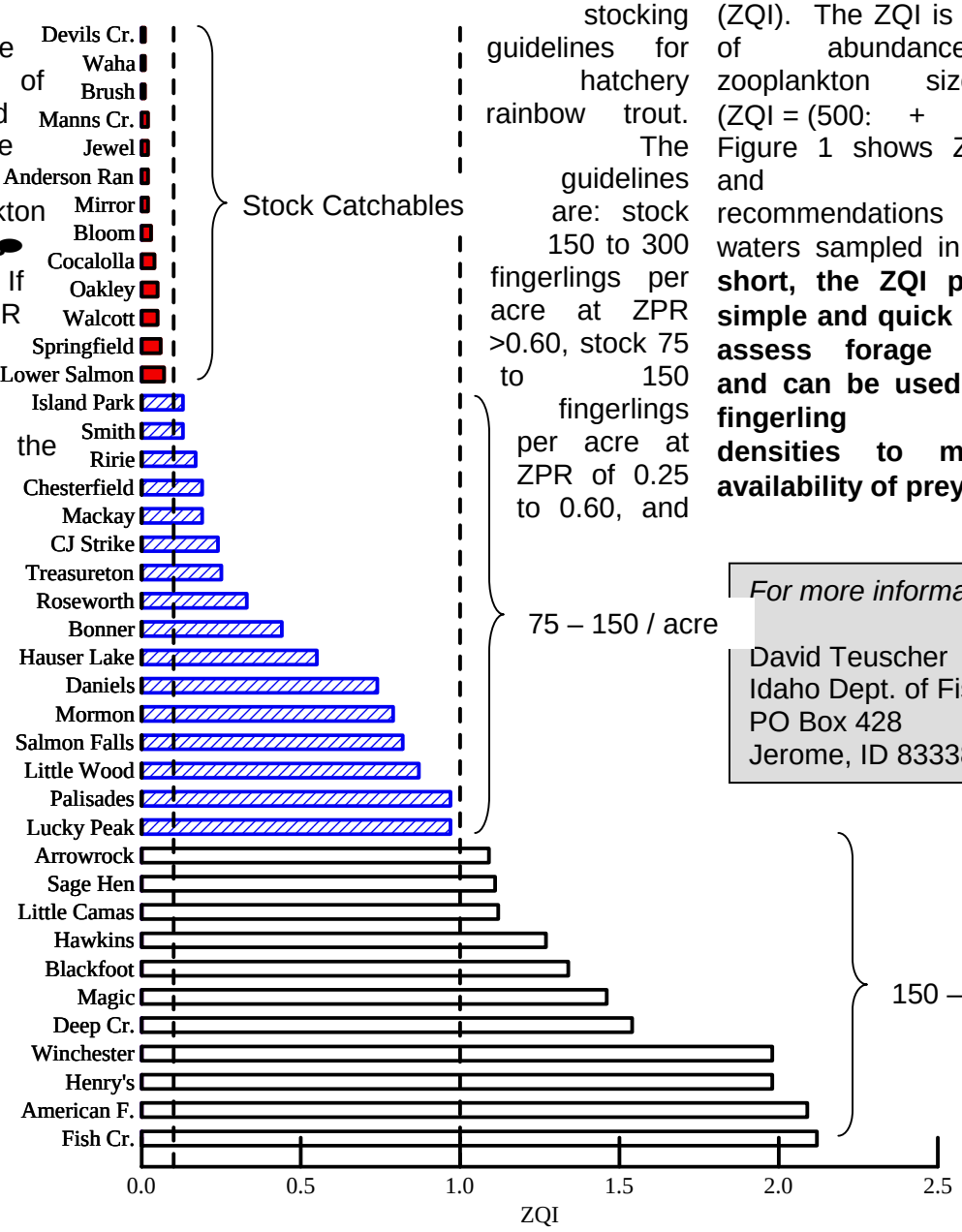

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Figure 1. ZQI results from 40 Idaho lakes and reservoirs. Suggested stocking densities for fingerling rainbow trout are shown and were based on similar standards used by the Wyoming Department of Game and Fish. Stock less than 75 fingerlings per acre or catchables in waters with ZQI <0.1.